Tune Feedback Integration With The Magnet System

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Tune Feedback Workshop

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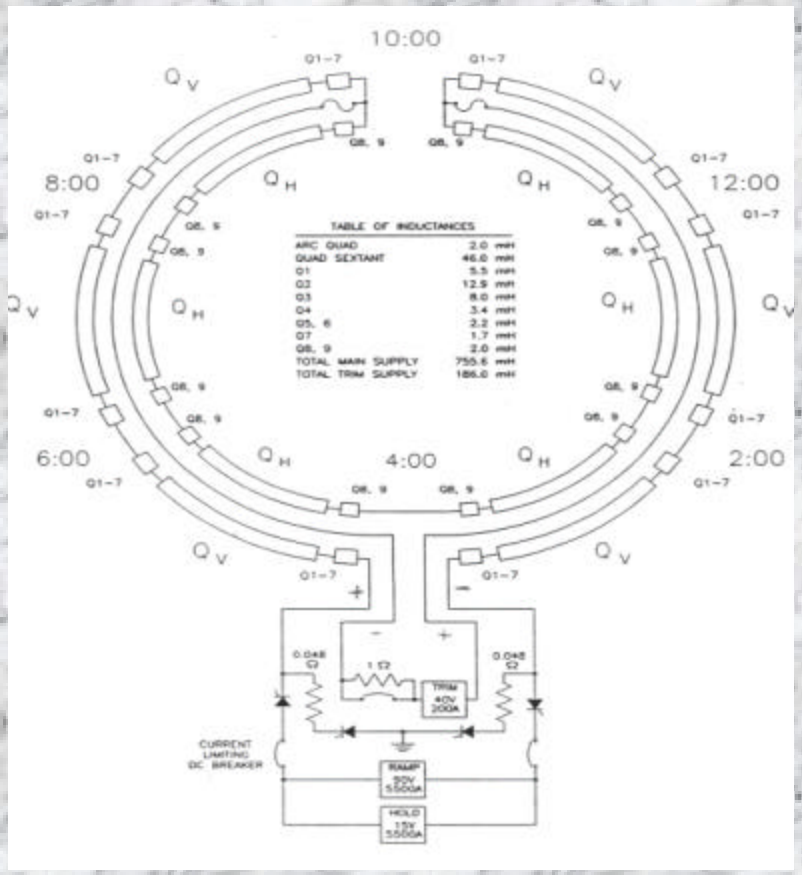
Tune Feedback Integration With The Magnet System



Main Quad Bus

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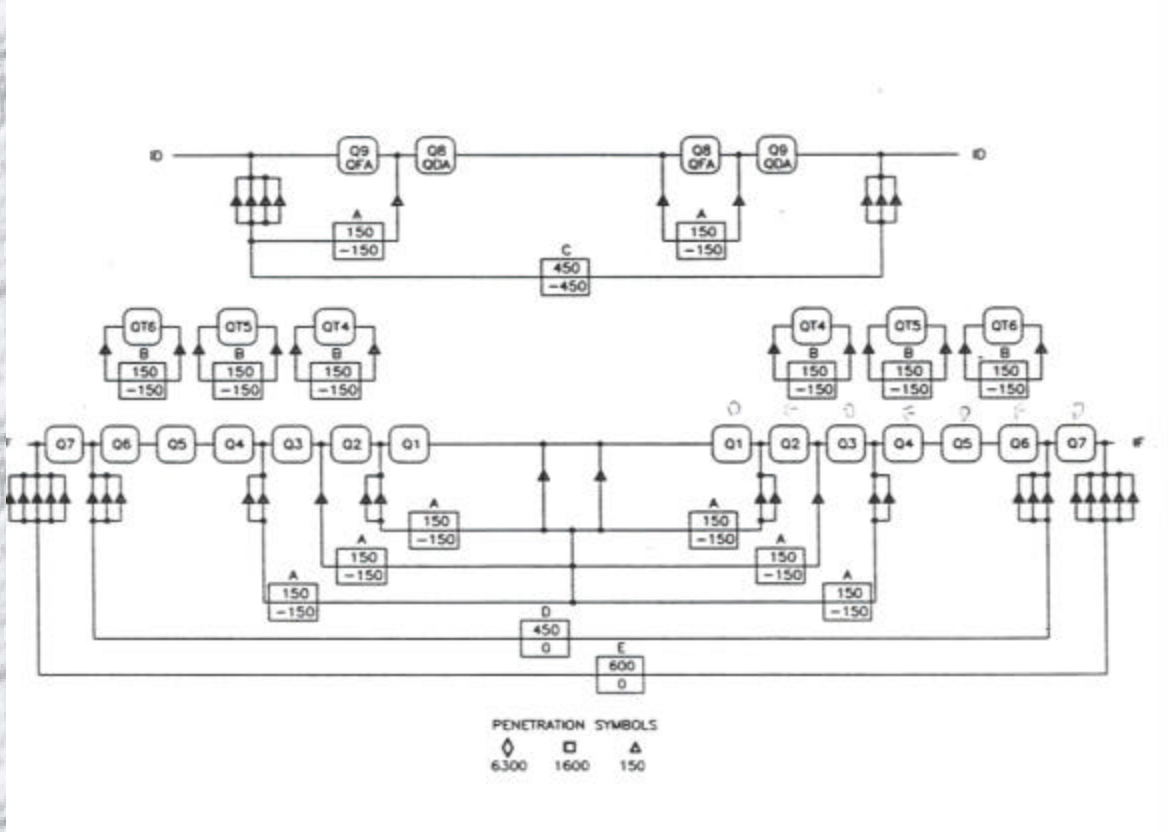

Quads at IRs 2,6,8, and 12 o’clock

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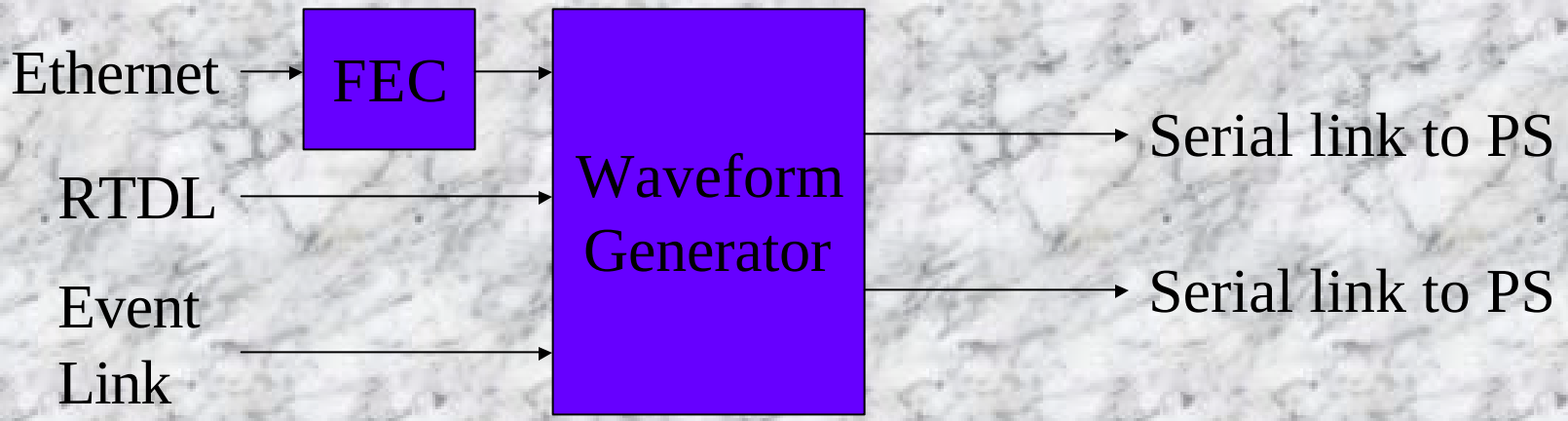

Waveform Generator Interconnections

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- Tables of strength versus Bρ are calculated by building a ramp using the off-line model. These tables are downloaded to the waveform generators before each ramp.
- The present Bρ is broadcast on the Real Time Data Link (RTDL) to the waveform generators. The waveform generators use the present Bρ to calculate the strength for each magnet.
- Transfer tables of magnet current versus magnet field are also downloaded to the waveform generators. Cubic spline interpolation is used to calculate the required current given the strength for each magnet.

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- The quad magnets in the Interaction Regions (IRs) are in the main quad circuit. Their current is individually adjusted by shunting some of the main quad current around them. This is done by nested power supplies.
- The waveform generators subtract the main quad current, and if necessary the trim quad current, from the calculated current. These quad currents are broadcast on the RTDL.
- This current is sent to the power supply interface card. This card has two inputs; the second input is used to send the current of the “previous” waveform generator. This current is subtracted from the total calculated current and the result is sent to the power supply.

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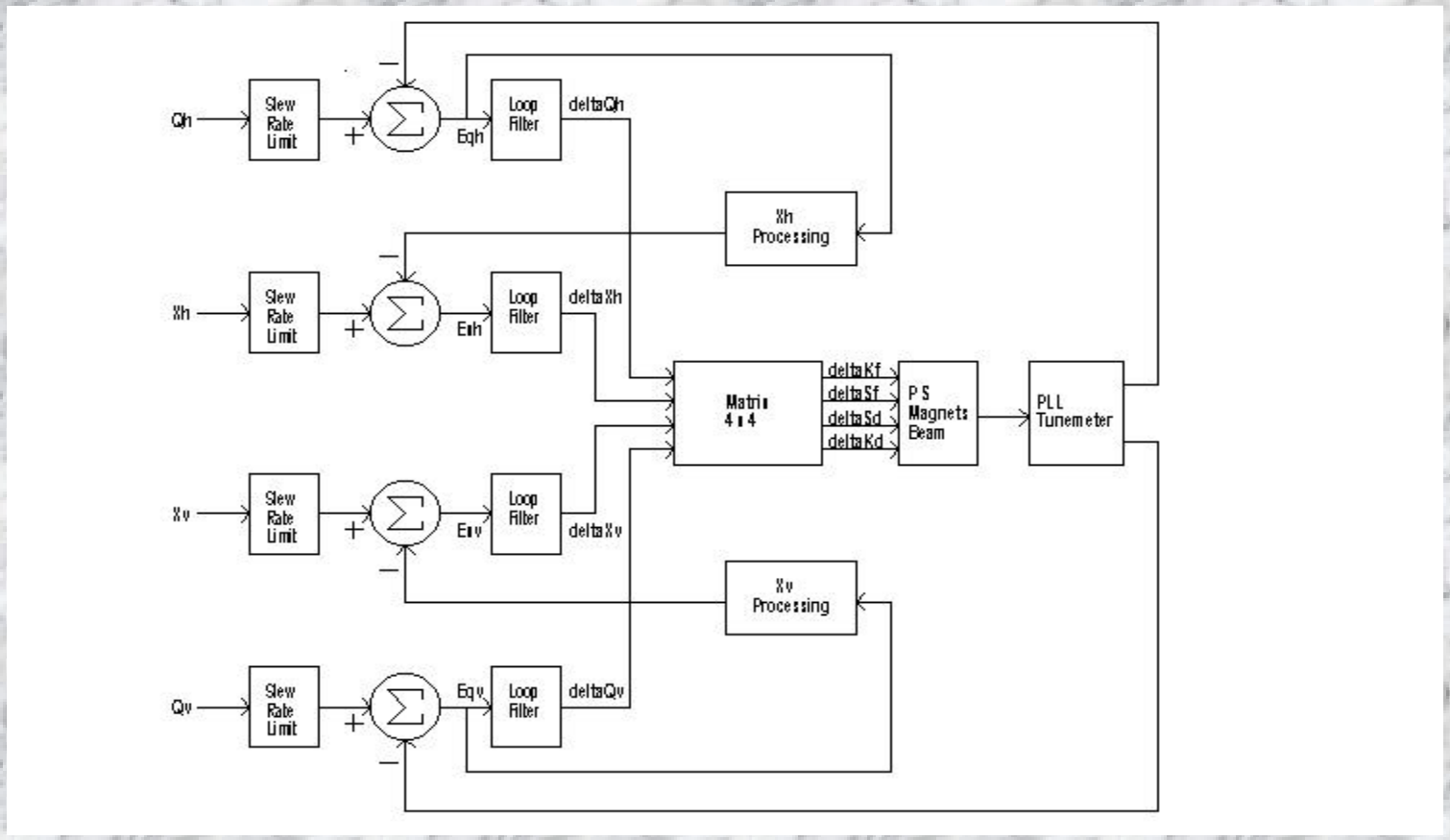
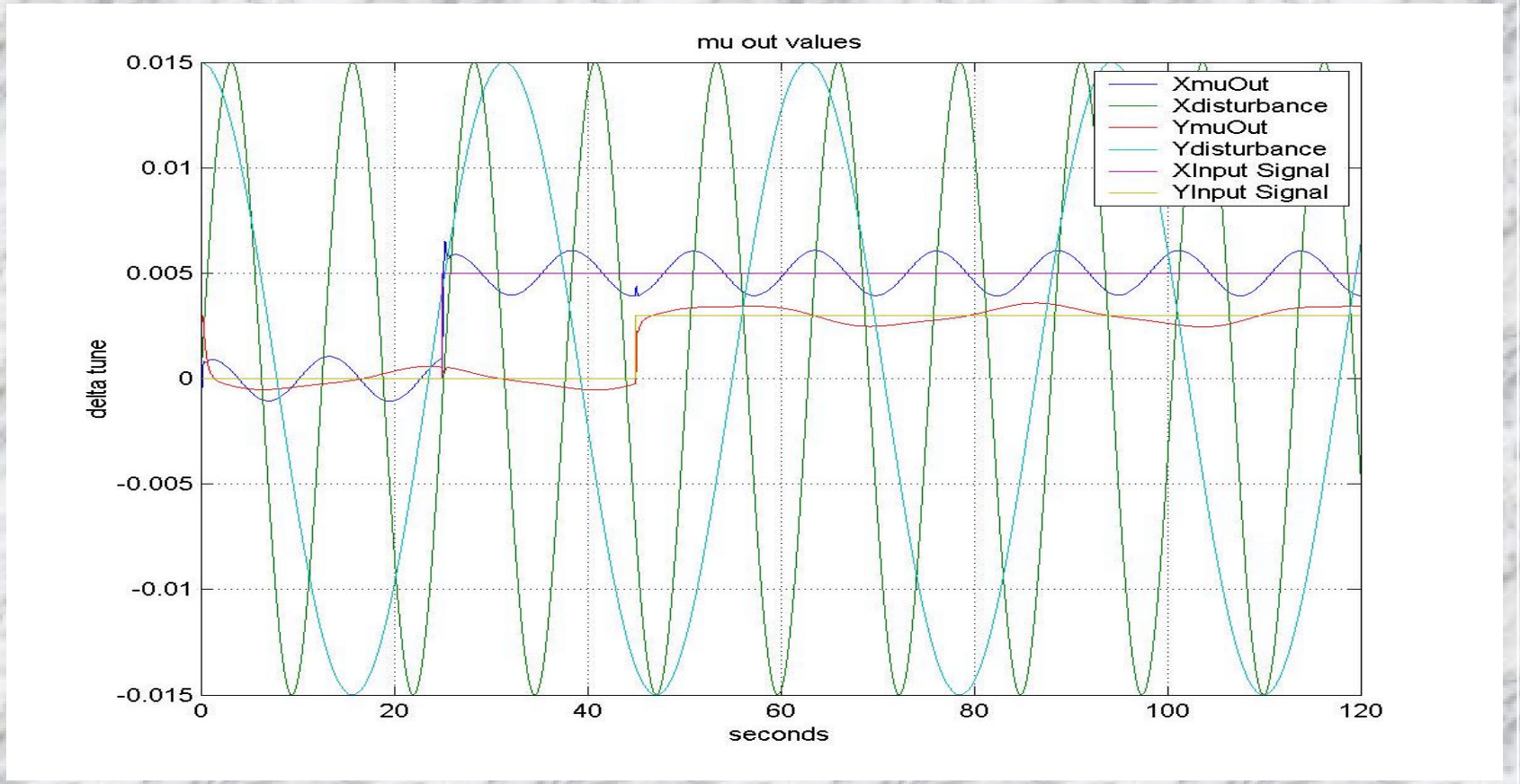
- The RTDL also broadcasts delta strengths, in real-time, for the Main Quads and the Sextupoles. This delta strength is added to the strengths from the tables. This adjusts the main quad currents to control the tunes.
- The IR waveform generators subtract the main quad currents from their magnet currents, this compensates the changing main quad currents and the IRs are not disturbed.
- The sextupoles can be controlled by a similar process to adjust the chromaticity.

Tune Feedback



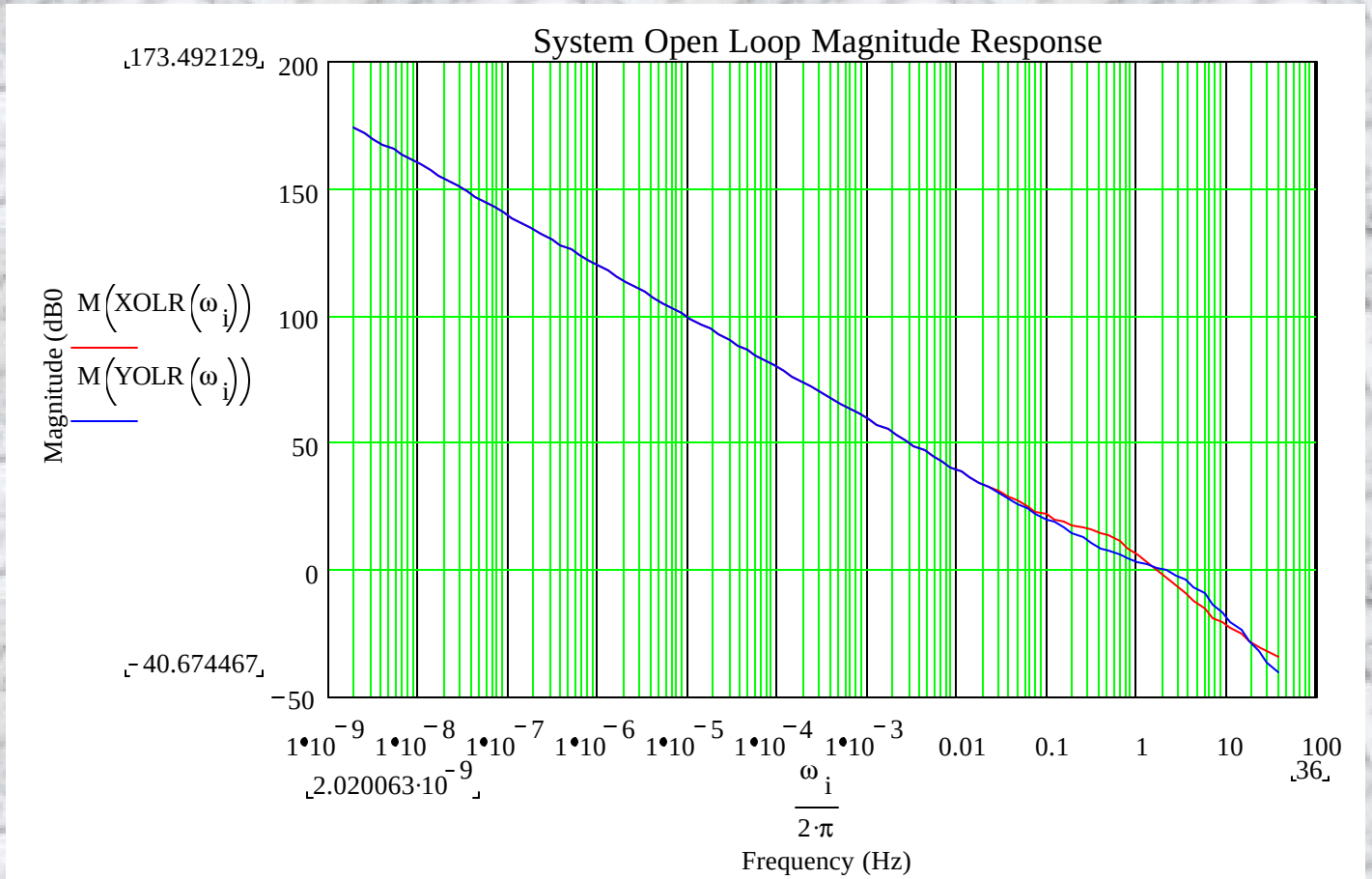
Tune and Chromaticity Feedback Block Diagram

Tune Feedback



Tune Feedback MatLab Simulation

Tune Feedback



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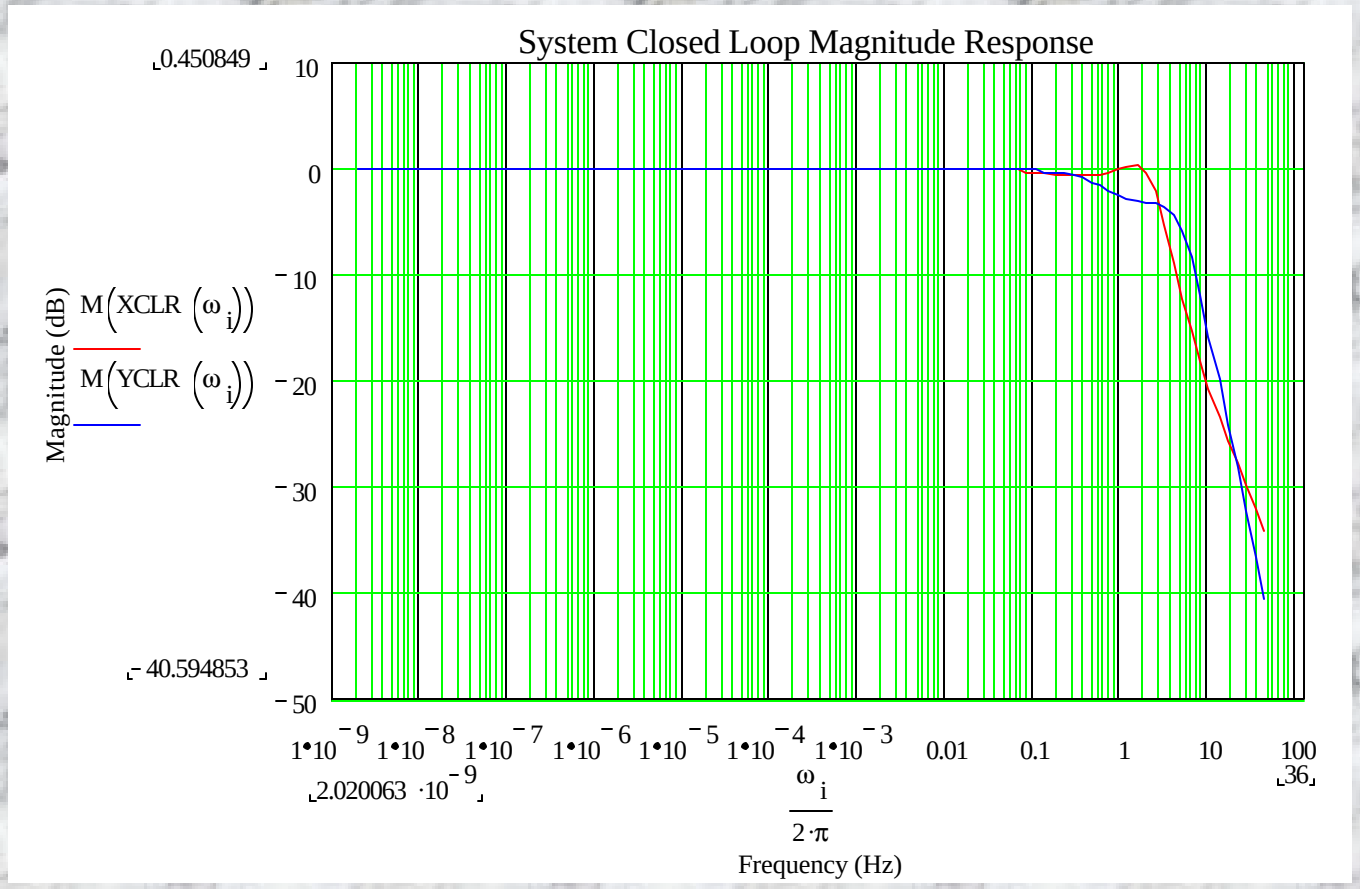
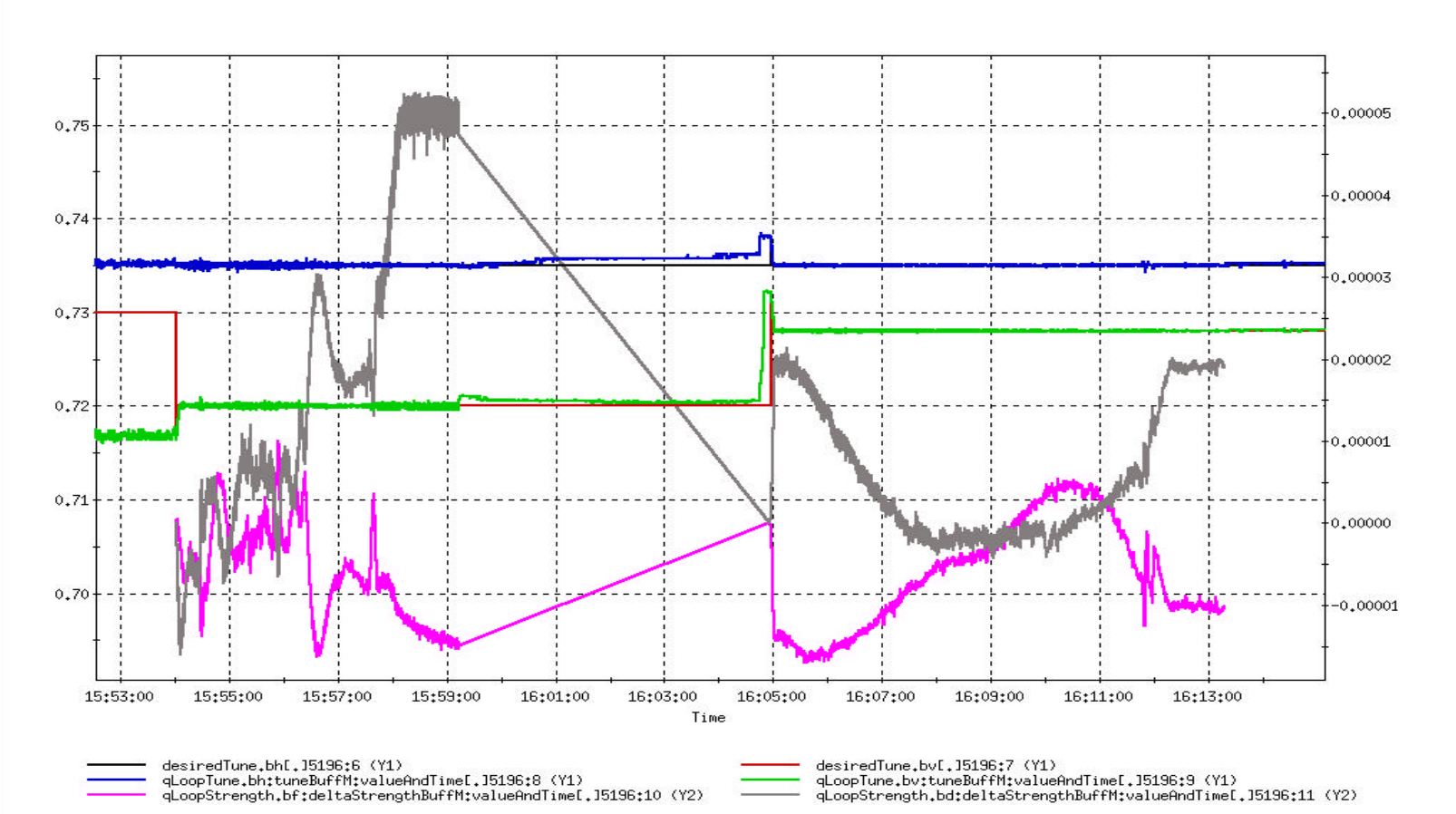
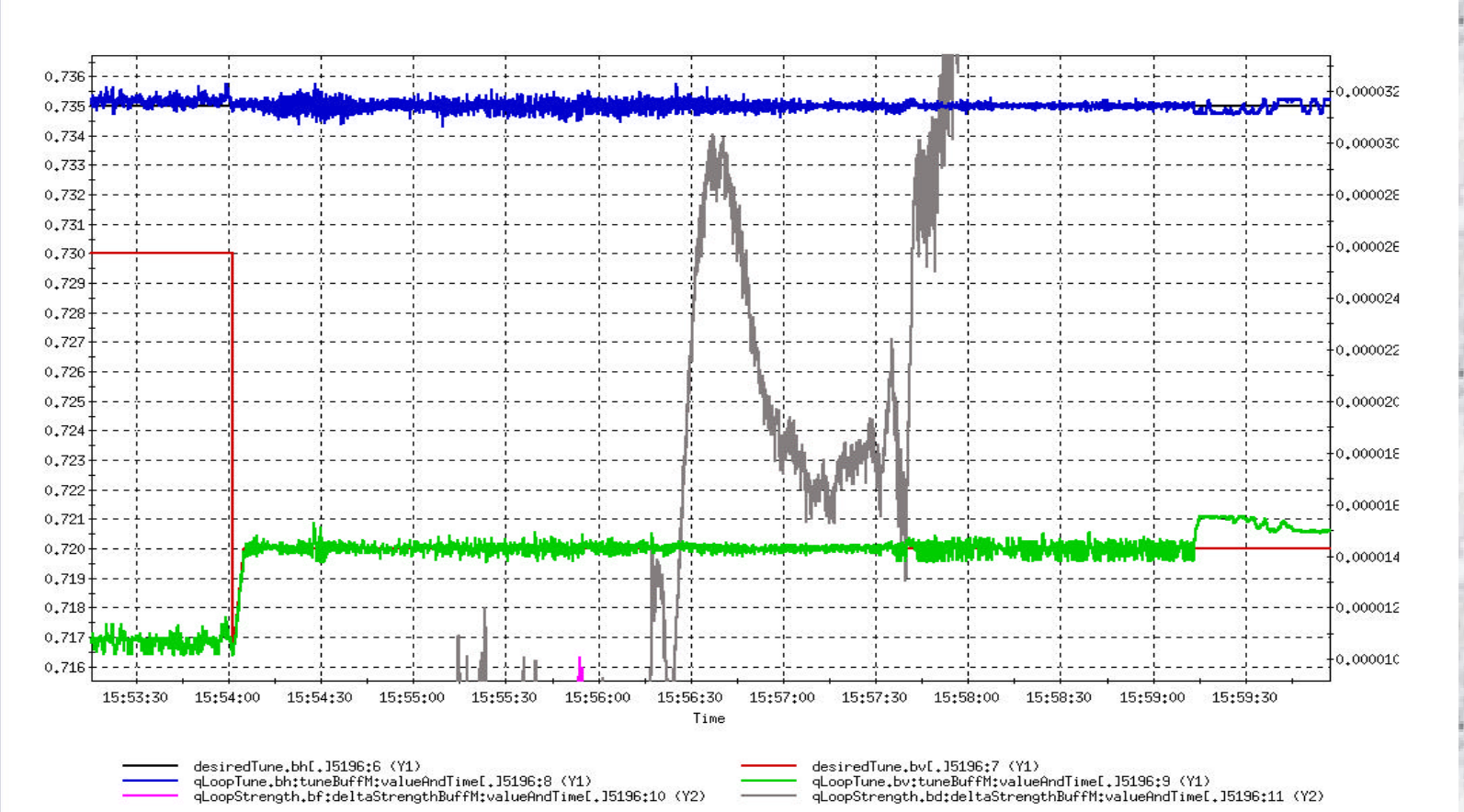


Tune Feedback



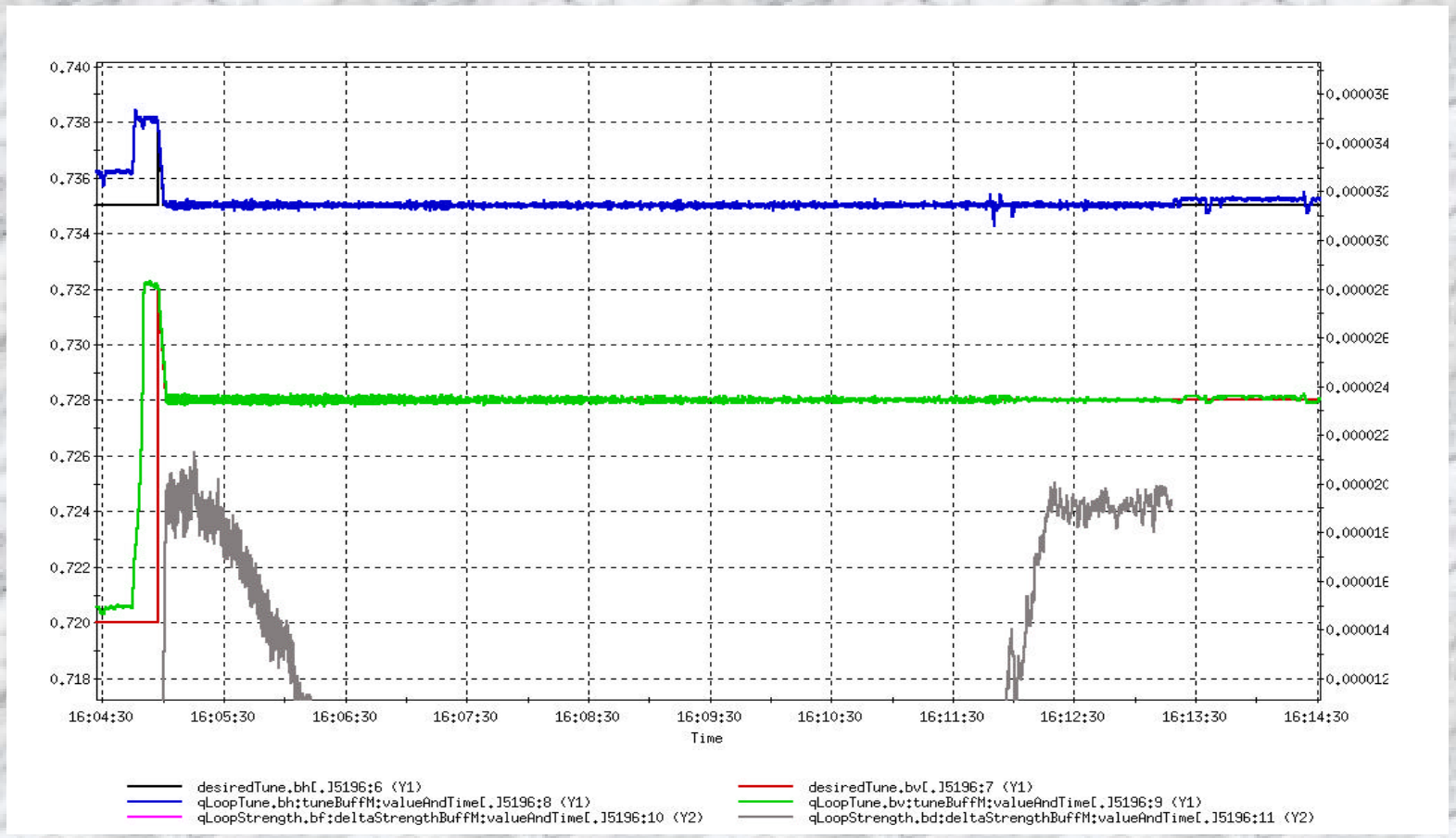
Two Ramps from 6/26/04

Tune Feedback



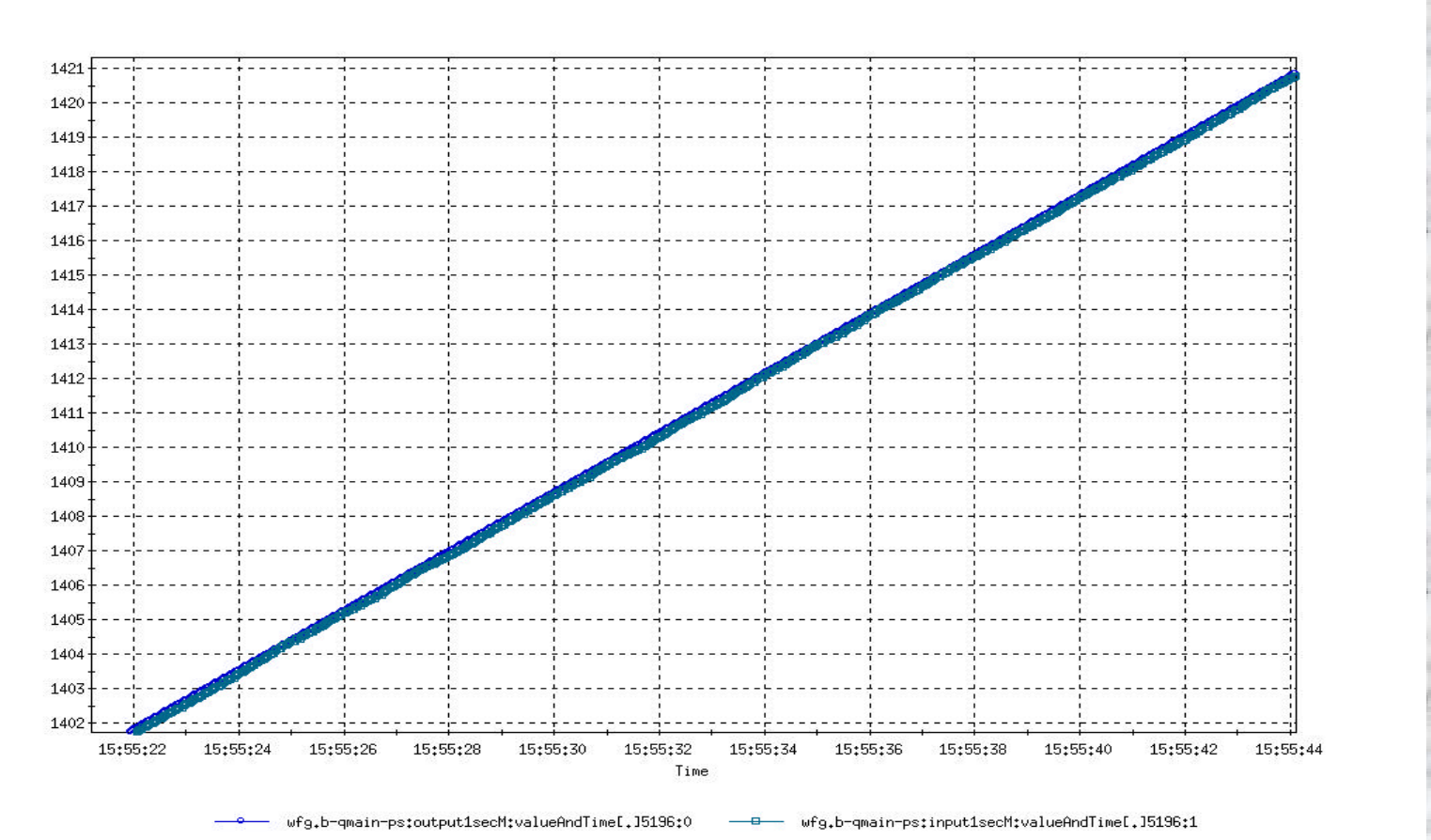
Energy Ramp from 4/26/04

Tune Feedback



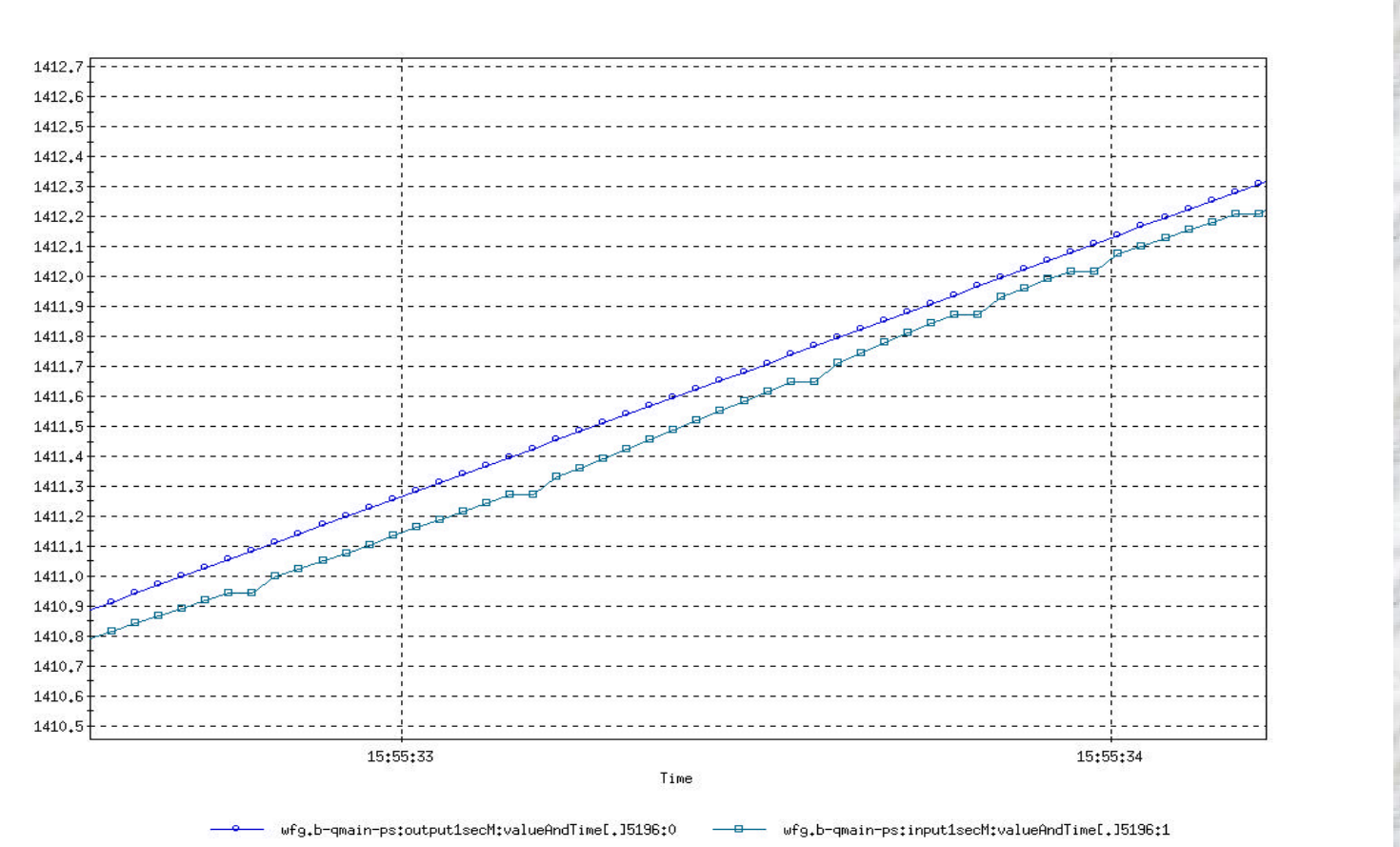
Rotator Ramp from 4/26/04

Tune Feedback



Current During The Energy Ramp

Tune Feedback



Current During The Energy Ramp